



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
OF THE SECOND TEN-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN  
REQUEST FOR RELIEF FOR BOSTON EDISON COMPANY  
PILGRIM NUCLEAR POWER STATION  
DOCKET NO. 50-293

1.0 INTRODUCTION

The Technical Specifications (TSs) for Pilgrim Nuclear Power Station (PNPS) states that the inservice inspection of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code (ASME Code) and applicable addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulties without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first ten-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable edition of Section XI of the ASME Code for the PNPS second ten-year inservice inspection (ISI) interval is the 1980 edition through the winter 1980 addenda. The PNPS second ten-year interval ended June 30, 1995.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law, will not

endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

In a Safety Evaluation Report dated May 18, 1995, the NRC staff authorized Boston Edison (BECO) relief from non-destructive examinations during the second interval (ending June 30, 1995) that were required for the residual heat removal and fuel pool cooling (RHR/FPC) intertie piping. The request was authorized based on a proposed modification to the line to relocate the class boundary in Refueling Outage (RFO) #11 (currently scheduled for March 1997). In a letter dated March 5, 1996, BECO notified the NRC of a decision to cancel the proposed modification of the subject line, based on the 1989 edition of Section XI, the Code of record for the third interval. In a letter dated May 30, 1996, the licensee provided the additional information, and submitted a revised request for relief for the examinations required to be performed to satisfy the second ten-year ISI requirements.

## 2.0 EVALUATION AND CONCLUSIONS

The staff, with technical assistance from its contractor, the Idaho National Engineering Laboratory (INEL), has evaluated the information provided by the licensee in support of its second ten-year interval inservice inspection program plan request for relief for PNPS. Based on the information submitted, the staff adopts the contractor's conclusions and recommendations presented in the Technical Evaluation Report (TER) attached.

The staff has reviewed the licensee's request for relief from the second ten-year interval Code examination requirements for the subject RHR/FPC intertie piping welds and supports and has concluded that the radiation dose associated with the examinations required by the Code of record for the second interval, and the exclusion from examination allowed by the Code of record for the third interval, imposing the second interval examination requirements on the licensee will result in a burden without a compensating increase in quality and safety. In addition, the licensee's proposed examination of a 7.5 percent sample of the RHR/FPC intertie piping welds and a 15 percent sample of supports in the third interval provides reasonable assurance of operational readiness of the RHR/FPC intertie piping welds and supports. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii), provided that a 7.5 percent sample of RHR/FPC intertie welds and a 15 percent sample of supports are examined in the third interval.

Principal Contributor: T. McLellan

Date: September 27, 1996

TECHNICAL LETTER REPORT  
ON THE REQUEST FOR RELIEF FROM  
SECOND INTERVAL EXAMINATION REQUIREMENTS  
FOR  
PILGRIM NUCLEAR POWER STATION  
BOSTON EDISON COMPANY  
DOCKET NUMBER: 50-293

## 1.0 INTRODUCTION

In a Safety Evaluation Report dated May 18, 1995, the Nuclear Regulatory Commission (NRC) authorized Boston Edison (BECo) relief from nondestructive examinations during the second interval (ended June 30, 1995) that were required for the Residual Heat Removal and Fuel Pool Cooling (RHR/FPC) intertie piping. The request was authorized based on a proposed modification to the line to relocate the class boundary in Refueling Outage (RFO) #11 (currently scheduled for March 1997). In a letter dated March 5, 1996, BECo notified the NRC of a decision to cancel the proposed modification of the subject line, based on the 1989 Edition of Section XI, the Code of record for the third interval. During a telephone conversation on April 3, 1996, between the NRC, Idaho National Engineering Laboratory (INEL), and BECo, additional information regarding the licensee's decision was requested. In a letter dated May 30, 1996, the licensee provided the additional information, and submitted a revised request for relief for the examinations required to be performed to satisfy the second 10-year ISI requirements. The INEL staff has evaluated the subject request in the following section.

## 2.0 EVALUATION

The Code of record for the second 10-year interval at Pilgrim Nuclear Power Station, which ended June 30, 1995, was the 1980 Edition through the Winter 1980 Addenda of the *American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI*. The information provided by the licensee in support of relief from examination requirements for the Residual Heat Removal and Fuel Pool Cooling (RHR/FPC) intertie piping has been evaluated and the basis for disposition is documented below.

Request for Relief, Second Ten-Year Interval, Examination Category C-F, Class 2 Piping Welds and Examination Categories F-A, F-B, and F-C, Component Support Examinations on the Residual Heat Removal and Fuel Pool Cooling (RHR/FPC) Intertie Piping

Code Requirement: The 1980 Edition through the Winter 1980 Addenda, Table IWC-2500, Examination Category C-F, requires that 25% of all Class 2 piping welds be examined each interval. Table IWF-2500 requires that 100% of the component supports be examined each interval.

Licensee's Relief Request: The licensee requests relief from completing the second interval nondestructive examinations on the Residual Heat Removal and Fuel Pool Cooling (RHR/FPC) intertie piping.

Licensee's Basis for Relief (as stated):

"The 1980 Winter Addenda of ASME Section XI, Subarticles IWC-2500 and IWF-2500 required the inspection of all hangers and at least 25% of the welds in Category C-F of Table IWC-2500-1 with no restrictions on piping wall thickness. This inspection requirement included all Class 2 piping hangers and specific welds in the RHR/FPC intertie. These welds and hangers are located in high radiation areas.

"The RHR/FPC intertie piping welds and supports within the second ten-year ISI interval scope and ASME Code examination requirements are shown in Attachment #1. The intertie piping is ASME Code Class 2 category up to valve 1001-103 and passes through high radiation areas. The section of intertie piping in question (i.e., between the RHR suction line and valve 103) is shown functionally on Figure 1<sup>1</sup>. Figure 2 represents an expanded isometric view of this section of piping. The horizontal portion of the piping above the 74'-3" elevation is located within high radiation areas.

"The second ten-year ISI interval inspections would have resulted in an exposure of approximately 7 man-rem by test personnel during the examinations as shown in Attachment #2. Thus, we sought relief from the second ten-year ISI interval due to ALARA considerations. A relief from the Third Ten-Year ISI Program is not required since we are implementing 1989 Edition of the ASME Code which provides flexibility in the selection of welds and supports for examination.

"Quality and Safety Considerations:

"ISI Examination Results: The integrity of the RHR/FPC intertie piping during the second ten-year ISI interval was assured. During the first ten-year ISI interval, three welds in the RHR/FPC intertie piping were volumetrically examined with no findings. During the second ten-year ISI interval, five welds in the intertie piping were examined with no findings. In addition, ASME Section XI VT-2 leak test examination of the vertical portion of the intertie piping was completed during RFO#10 with no findings. Failure of the intertie piping was not expected because

---

<sup>1</sup>Figures are not included with this evaluation.

examinations of welds in similar Class 2 piping showed no signs of cracking. The intertie piping is installed with seismic restraints and hangers. No degradation in piping supports had been noted during previous ISI inspections.

"Thus based on the examination results of welds in similar piping and the favorable in-service performance of the intertie piping during the first and second ten-year ISI intervals, BECo was confident that the section of intertie piping located in the high radiation area was structurally sound.

"System Considerations" The RHR/FPC intertie is branched from the shutdown cooling line that provides suction to the RHR pumps. This portion of the line is normally isolated during power operation. A manual isolation valve, 1001-103, in the intertie line separates the ASME Class 2 RHR piping from the non-code FPC piping.

"Since this is low pressure, low temperature piping (except during the brief initial stages of infrequent cool downs), leaks are more likely to have resulted from weld failures that might occur instead of outright pipe failure. Such leakage would have been detectable due to an increase in floor drain volume or loss of spent fuel pool water inventory. Repairs to leaking pipe in the intertie piping would not likely have been hampered by high temperature or pressure.

"Catastrophic failure of this Class 2 intertie piping was judged to be extremely improbable. However, had it occurred, loss of reactor water level would have been stopped by automatic isolation of the RHR shutdown cooling suction line (since intertie is branched out from the RHR suction line). Also, ECCS makeup systems were available to flood the vessel. Operators were trained on procedures to deal with loss of reactor water level or shutdown cooling (e.g., PNPS Procedure 2.4.25 provides for cool down upon loss of shutdown cooling). Note that postulated weld failure leading to pipe leaks or breaks in this section of piping is only of safety significance during cold shutdowns because the intertie piping is isolated during normal operation.

"The RHR/FPC intertie is used for augmented fuel pool cooling without shutdown cooling (mode 2 operation PNPS Procedure 2.2.85.2). The consequences of failure of the intertie piping on the RHR side of 1001-103 valve would have been mitigated using an outage specific alternate water level makeup and decay heat removal procedure (i.e., TP 95-010, "RFO 10, Compensatory Measures"). Thus, the failure of the intertie would not have affected plant safety. Therefore, the relief request met



the requirements of 10 CFR 50.55a(a)(3)(i) in that an acceptable level of quality and safety were maintained during the second ten-year ISI interval.

"Third Ten-Year ISI Considerations: The requested relief for the third ten-year ISI interval is not required. Pilgrim is implementing the 1989 Edition of ASME Code. The Section XI, Category C-F-2 of Table IWC-2500-1 has been revised with respect to Class 2 piping of less than 0.375 inch wall thickness. The intertie piping is M-300 Pipe Class HB (6-inch schedule 40) with a wall thickness of 0.280 inch. The revised requirement states that only 7.5% of the welds for Class 2 pipe wall thickness  $\geq 0.375$  inch require examinations. Also, Code Case N-491, Category F-A, Table 2500-1 now requires only 15% of the hangers be inspected. Rather than exclude thin-wall pipe welds from the ISI Program as allowed by the revised code, the NRC has determined that a 7.5% augmented volumetric sample of thin-wall piping welds should be included in the program. This determination is included in item C of NRC letter dated December 6, 1995 (TAC M93398).

"Pilgrim's Third Ten-Year ISI Program includes a sample of RHR/FPC intertie hangers and welds in full compliance with the revised code selection criteria and NRC guidance. Weld HB-10-F79, and hangers H-10-1-17SS and H-10-1-182 are scheduled to be examined during RFO#11. Weld HB-10-3003-2-2 is scheduled for examination in the third period of the current third ten-year interval. These welds will be volumetrically examined following the examination requirements and acceptance standard of Examination Category C-F-2, Item No. C5.60 of ASME Section XI, 1989 Edition. This code does not require examination of these welds, since the intertie piping is 6-inch schedule 40 with less than 3/8-inch wall thickness. However, the planned examinations are intended to comply with the NRC guidance to perform augmented examinations of certain thin-wall piping excluded by the code. In addition, ASME Section XI VT-2 leak test of the intertie piping up to the 103 valve is scheduled during RFO#11. Thus, compliance with the NRC guidance will be achieved during the third ten-year ISI interval, and the inspections should reinforce the bases for granting the requested relief with no conditions.

Licensee's Proposed Alternative: The licensee proposes to augment the ISI program by volumetrically examining a 7.5% sample of Residual Heat Removal and Fuel Pool Cooling (RHR/FPC) intertie piping welds and visually examining a 15% sample of component supports on the subject piping.

Evaluation: In a Safety Evaluation Report dated May 18, 1995, the NRC authorized relief from completing the second interval nondestructive examinations on the Residual Heat Removal and Fuel Pool Cooling (RHR/FPC) intertie piping at Pilgrim Nuclear Power Station. Relief was contingent upon a proposed modification to this line (to relocate the class boundary by valve installation) during RFO #11. By letter dated March 5, 1996, the licensee notified the NRC that the modification of the RHR/FPC intertie line scheduled for RFO #11 had been cancelled. This cancellation was based on the Code of record for the third ten-year interval (1989 Edition), which allows exclusion of these pipe welds and supports from nondestructive examination based on the piping wall thickness. As a consequence of cancelling the modification, the licensee is required to complete the second 10-year interval examinations on the subject piping.

The licensee completed five of fourteen examinations in the second interval. The licensee estimates that examining the remaining areas scheduled in the second interval would result in approximately 7 man-rem exposure to test and support personnel. Considering the examinations performed during the second interval, and the change in Code requirements for the third interval that allows exclusion of the subject piping from nondestructive examination, the INEL staff believes that imposing the Code requirements of the second interval on the licensee will result in an unnecessary burden.

The licensee proposes to examine a 7.5% sample of RHR/FPC intertie welds and a 15% sample of supports in the third interval in full compliance with the selection criteria in the 1989 Edition of Section XI and NRC guidance. The INEL staff believes that the licensee's proposal will provide reasonable assurance of operational readiness. Therefore it is recommended that the licensee's proposed alternative be authorized, pursuant to 10 CFR 50.55a(a)(3)(ii), provided that a 7.5% sample of RHR/FPC intertie welds and a 15% sample of supports are examined in the third interval.

### 3.0 CONCLUSION

The INEL staff has reviewed the licensee's request for relief from the second 10-year interval Code examination requirements for the subject RHR/FPC intertie piping welds and supports. Considering the radiation dose associated with the examinations required by the Code of record for the second interval, and the exclusion from examination allowed by the Code of record for the third interval, the INEL staff believes that imposing the second interval examination requirements on the licensee will result in a burden without a compensating increase in quality and safety. The licensee proposes to examine a 7.5% sample of the RHR/FPC

inertie piping welds and a 15% sample of supports in the third interval. Based on the licensee's proposed alternative, reasonable assurance of operational readiness will be provided. Therefore it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii), provided that a 7.5% sample of RHR/FPC inertie welds and a 15% sample of supports are examined in the third interval.